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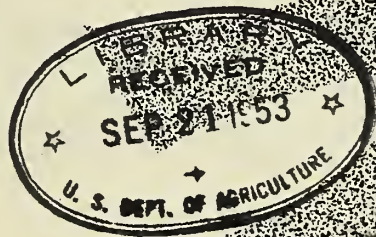


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Soaps and synthetic detergents for home laundering of cottons



Bureau of Human Nutrition and Home Economics
United States Department of Agriculture

POINTERS ON DETERGENTS FOR COTTON

For fine fabrics and colors that may fade

Use unbuilt soaps or unbuilt synthetic detergents.

For heavily soiled cottons

Use built soaps or built synthetic detergents.

In soft water

Soaps and some built synthetic detergents are best.

In hard water

Built synthetics are the most efficient of the detergents.

If fabrics and dyes will stand it

Wash in hot water instead of lukewarm. (Remove stains first, for some are set by hot water.)

When using soaps

Maintain a good suds.

When using synthetic detergents

Use the amount recommended--remember that some synthetics clean without suds.

SOAPS AND SYNTHETIC DETERGENTS FOR HOME LAUNDERING OF COTTONS

Good results in laundering depend largely on selection of the proper soap or synthetic detergent (soapless cleaner) and its correct use in relation to the fabric and to the type of soil to be removed. Stores display many kinds of such cleaners--detergents as chemists call them--but little information is available concerning their relative efficiency in getting clothes clean. Consequently homemakers are asking questions like these: "What is the best detergent for the family wash?" "Should it be used in hot water?" "Will it work in hard water?"

To help answer these questions, research chemists at the Bureau of Human Nutrition and Home Economics are studying soaps and synthetic detergents under standardized laboratory conditions. So far, they have measured the ability of more than 50 detergents to wash dirt out of heavily soiled cotton cloth in soft and hard water at two different temperatures. The effect of detergents on color, firmness, and strength of cotton cloth is yet to be investigated. Also, future work will include similar studies on various kinds of wool and rayon fabrics.

CLEANING ACTION OF DETERGENTS

The essential steps in cleaning fabrics are wetting the fabric and the dirt, removing the dirt from the fabric, and holding

the removed dirt in suspension--that is, keeping it from redepositing or settling on the fabric before it is rinsed away.

This is the way a good detergent acts. Water alone has little ability to wet the fabric or to mix with oily dirt. Addition of a detergent increases both the wetting and mixing power of water. The detergent solution gets in between the dirt and the fabric and wets both. On agitation, the oily dirt is broken up into smaller parti-

cles, each of which is surrounded by a film of the solution that prevents the particles from recombining and settling out of the solution. Thus, as the oily soil is lifted off the fabric, the detergent holds it in suspension so that it cannot settle back on the material being cleaned, and redeposited soil that causes gray washes is avoided.

DETERGENTS ON THE RETAIL MARKET

Soaps

The detergent most familiar to everyone is soap, usually made from fat and lye. When used with hard water, soap reacts with the calcium and magnesium compounds--materials that make water hard--to form soap scum or curds. Not only is soap wasted, but the scum settles out on clothes in specks that are almost impossible to rinse out.

In retail stores homemakers find at least two types of laundry soap--unbuilt, which is almost pure soap, and built soap, a mixture

of soap and one or more chemicals called builders.

Unbuilt.--Unbuilt soaps usually contain 93 to 97 percent soap, a little moisture (water), and a small amount of sodium chloride (common salt). Such soaps, intended for laundering fine fabrics, are relatively safe for colors and mild to hands.

Built.--Built soaps contain not less than 50 percent soap with varying amounts of alkaline builders, which include washing soda (sal soda) borax sodium silicate (water glass), trisodium phosphate, and

various complex phosphates. These chemicals aid in soil removal. They improve the cleaning action of soap and also help to soften hard water so that formation of soap scum is lessened.

Common brands of built soap contain from 55 to 80 percent soap, about 5 percent moisture, and sometimes a fluorescent dye for whitening clothes, besides the builder.

Built soaps are general-purpose soaps for laundering heavily soiled cotton cloth.

Other mixtures of soap and builders are soap powders or washing powders, which contain only 10 to 15 percent soap. They should not be confused with powdered soaps. The latter means soap in a powdered form instead of bar, chip, flake, or bead. Soap powders are sometimes used for laundering, but more often for dishwashing.

Synthetic Detergents

Newer than soaps are the synthetic detergents. They had their start after the first

World War and have been gaining ground as laundry cleaning agents. They were developed to obtain washing preparations that would overcome some of the disadvantages of soap. With them no sticky calcium and magnesium precipitates form in hard water.

At first synthetic detergents did not give the same brightness to cottons that soaps do, especially on successive washings. However, in the new improved synthetics this difficulty has been overcome.

Synthetic detergents are quite different from soaps. They are made from such raw materials as petroleum and animal and vegetable fats and oils by a chemical process considerably more complicated than the reaction of fat with lye which makes soap. The resulting chemicals are complex and involved. Chemists call them salts of sulfated and sulfonated alcohols, esters, amides, and ethylene oxide condensation products. Each of these chemicals has value as a cleaning agent distinct and different from that of the others.

Some synthetic detergents form suds readily like soap, whereas others clean with little or no suds. Many of them contain large amounts of sodium sulfate or sodium chloride, by-products of the manufacturing process. These neutral salts help somewhat in cleaning, but have no effect in softening water as do the alkaline builders.

As with soaps, two types of synthetic detergents, unbuilt and built, are put up for the retail trade.

Unbuilt.--The unbuilt synthetic detergents may contain only 30 to 40 percent pure

detergent, a different chemical in each. In addition they have from 50 to 60 percent neutral salts but no alkaline-salt builders. They are practically neutral in solution.

Like the unbuilt soaps, the unbuilt synthetics are recommended for washing fine fabrics.

Built.--The built synthetics, like the built soaps, contain alkaline salts, either silicates or phosphates, which increase their cleaning ability. Built synthetics are general-purpose detergents for washing heavily soiled clothes.

LABORATORY STUDY OF DETERGENTS

For the laboratory study of detergents, research workers at the Bureau prepared a soiled (dark gray) test cloth by dipping white cotton sheeting in a soiling mixture composed of graphite, tallow, and mineral oil in carbon tetrachloride, and measured the grayness of the soiled cloth with a light reflectance meter.

They washed samples of the test cloth separately in an experimental washing machine called a Launder-ometer, with temperature accurately controlled for both the wash and rinse waters. Several different concentrations of each detergent were tried in soft (distilled) water and in water of 300 parts per million hardness, at lukewarm (about

100° F.) as well as at a high temperature (140° F.).

Finally the samples of cloth were dried and their light reflectance checked again. The greater the difference in reflectance before and after laundering, the more soil was removed by the particular soap or synthetic detergent and, therefore, the greater its efficiency.

Efficiency of Detergents

Under the conditions of this study the different unbuilt soaps were equally efficient in removing soil. All removed more soil in hot water than in lukewarm. Also they were much more effective in soft water than in hard, since it took approximately three times as much soap in the hard water used to remove the same amount of soil. Considerable soap was used up in softening the hard water.

There was little difference among the various built soaps studied. In general they were only slightly more effective than the unbuilt. All removed considerably more soil in hot water than in lukewarm.

Like the soaps, the synthetic detergents were generally more effective in hot water than in lukewarm. In soft water the unbuilt synthetics were only two-thirds to three-fourths as effective as the soaps, but in hard water they were somewhat more effective than soaps, especially when small amounts were used.

Some of the phosphate-built synthetics removed as much soil as the soaps in soft water. Also, in the hard water they retained much of their soil-removing ability and were more than twice as efficient as the soaps. Other built synthetics were less efficient--in soft water they were about three-fourths as good as the soaps, and in the hard water not quite twice as good.

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